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ABSTRACT

The long-term goal of this investigation is to design and establish a national model for a system of library statistical data. This is a report on The Preliminary Study which was carried out over an 11-month period ending May, 1969. The objective of The Preliminary Study was to design and delimit The Research Investigation in the most efficient and meaningful way. The Preliminary Study concentrated on (1) the background research required to determine the nature and relevance of previous and ongoing research in this field and (2) the design of The Research Investigation. The Preliminary Study included a literature search and intensive review of relevant research, interviews with a wide variety of librarians, officials of library associations, government officials, and university researchers, and other activities relevant to the construction of the design of The Research Investigation. This final report primarily consists of a proposal for The Research Investigation and a summary of a background study on "Statistical Measures Required for Library Managerial Decision Making Under a Planning-Programming-Budgeting-System (PPBS)." This background study was a masters thesis by Jerome Ackerman (University of Pennsylvania), partially supported under the grant for The Preliminary Investigation. Appended are a 101-item bibliography and library benefit-cost management model. (Author/JB)

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A SYSTEMS ANALYSIS OF THE LIBRARY AND INFORMATION SCIENCE STATISTICAL DATA SYSTEM: THE PRELIMINARY STUDY

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OFFICE OF EDUCATION

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Preface

The authors of this report interviewed and received assistance from government officials, library directors and librarians at a variety of administrative levels, officials of library associations, research workers and others. The list of persons who rendered this aid is so long that no attempt is made here to give individual citations. However, our sincere appreciation is expressed to all of them, and errors of omission and commission in this report are solely those of the authors.

SUMMARY

Summary

This study is an investigation whose long run goal is the design and establishment of a national model for a system of library statistical data. There is a widespread recognition of a serious need for an improved system of library and information science statistical data. Such data subsume at least:

(1) the data which a library produces for its own administrative and management purposes

(2) data for budget justification and public relations functions in the private sector and at municipal, state and federal levels of government

(3) aggregative data at levels such as States, regions, and the country

Successful functioning of libraries depends on high quality management in both the private and public sectors. It is axiomatic that good management depends on high quality information.

The study is being carried out in two stages:

(1) The Preliminary Study

(2) The Research Investigation

This is a report on The Preliminary Study which was carried out over an 11-month period ending May, 1969. The objective of The Preliminary Study was to design and delimit The Research Investigation in the most efficient and meaningful way. The Preliminary Study concentrated on (1) the background research required to determine the nature and relevance of previous and ongoing research in this field and (2) the design of The Research Investigation. The Preliminary Study included a literature search and intensive review of relevant research, interviews with a wide variety of librarians, officials of library associations, governmental officials, and university researchers, and other activities relevant to the construction of the design of The Research Investigation.

This final report primarily consists of a proposal for The Research Investigation and a summary of a background study on Statistical Measures Required for Library Managerial Decision Making Under a Planning-Programming-Budgeting-System (PPBS). This background study was a masters thesis partially supported under the grant for The Preliminary Investigation.[1]

The Research Investigation is to be carried out in two phases.

Phase 1

Design and development of a management information system for large city public libraries and large university libraries.

Phase 2

(a) Tests of the feasibility, stability, effectiveness and costs of the management information developed in Phase 1.

(b) Extension of the management information system to systems, networks, and other cooperative arrangements among libraries.

Phase 1 is scheduled to be completed in one year, and it is anticipated that Phase 2 will require an additional year.

On the basis of The Preliminary Study, it was decided that this project should concentrate on the development of a management information system which would provide the information for the effective management of large city public libraries and university libraries. The management information system will be designed to support decision making and planning in a planning-programming budgeting context. The general purpose of the system will be to aid librarians, administrators, and board members in the planning and decision making process, in order that the library may operate at maximum effectiveness to yield maximum benefits. The system will be primarily concerned with the statistical information required for the library's administrative and managerial purposes, and with the information required at other levels, such as by library associations, legislators, government administrators, and funding officers.

The methodological approach to be used in Phase 1 is that of systems analysis. This method involves a specification of the major operational functions of a system and an identification and description of the interrelationships among the various components. The basic goal is to design an optimal system in order to maximize some measure of benefits in relation to the costs associated with different possible systems. Translated in terms of the present problem, two levels of model construction appear to be required. It seems axiomatic that the basic purpose of a management information system is to carry relevant information to decision makers. Hence, the first level of model construction is the design of a model of the library management planning and decision making process. The second level of model construction is the design and development of the information system required to optimize the performance of this management planning and decision making process.

Research conducted thus far has suggested the following major categories of statistical requirements of a PPBS design for cooperative public library systems:

(1) Demographic information, such as population data (age, sex, etc.). Population is a key to forecasting levels and costs of programs. For example, changing numbers and proportions of disadvantaged individuals in a community would have important implications concerning types of program decisions and levels of expenditure.

(2) Economic and social data, to project the economic future of the community, its potential for growth, the educational level of the community and its relationship to the use of libraries.

(3) Financial data, to determine program costs and to direct planning.

(4) Output indicators, to estimate the output or results of library expenditures by program. Traditionally, library budgets have been classified by objectives of expenditures, such as construction, facilities, personnel, and so on, without regard to the results of the expenditures. An analysis of library operations is needed for purposes of specifying library outputs and the feasibility and degree of difficulty of collection of data.

(5) Measures of effectiveness. Such measures as the library's ability and time required to produce documents, analogous measures in other areas of library service, and indicators of the quality of library services and their impact on the user are needed.

(6) Collection characteristics. In devising the program structure in terms of purpose and target group, it is necessary to know the magnitude of current holdings geared to the various target groups.

(7) System activities. Since public library systems are based on the principle of sharing resources and avoiding their duplication, each member of the system should be provided at least with data concerning the collection and programs of the central library and the systems headquarters, since the latter are the principal resource backstops of the system. Data relating to system activities and the activities of the member libraries are needed by each of these organizations in planning its programs effectively.

The statistical categories presented above are indicative of the general nature of the data required for a PPBS design. More explicit measures are the natural result of a detailed analysis of library operations, the formulation of objectives, program structure, measures of effectiveness, and indicators. As the level of analysis intensifies after a PPB system has been established and set into operation, specific statistical data requirements are made known.

The long run challenge of the research project reported on in these pages is the design, development, and implementation of a management information system that can deal effectively with current and emerging problems of an increasingly complex library environment.

INTRODUCTION

Introduction

There has been a long-standing recognition of the need for an improved system of library statistical information and statistical activities. As far back as a century ago, complaints were voiced within the library profession and the U. S. Office of Education concerning the incomparability and lack of standardization of data about library operations, finances and other related matters. An effort was made by the American Library Association (ALA) Cooperation Committee in 1877 to alleviate these deficiencies by the preparation of a model for statistical reports that helped standardize library data reported on ALA and Office of Education questionnaire forms. Over the ensuing years, repeated attempts have been made to close the gap between information requirements and the supply of statistical information in the library and information science field. In order that the frame of reference be clear, we repeat the ideas contained in the Summary that these information requirements stem primarily from library administrators, library associations, policy makers, legislators, and government administrators and that library statistics subsume at least (1) the data which a library produces for its own administrative and management purposes, (2) data for budget justification and public relations functions in the private sector and at municipal, state and federal levels of government, and (3) aggregative data at levels such as States, regions, and the country.

One of the most ambitious recent attempts to deal with the problem of standardization was the publication in 1966 of a handbook of library statistical concepts, definitions, and terminology by a research team headed by Joel Williams of the National Center for Educational Statistics of the U. S. Office of Education.[2] However, as was recognized by the developers of the handbook and as is widely acknowledged in the library field, the problem of developing a comprehensive system for collection processing, and dissemination of the variety of data needed by the aforementioned users ranges far beyond the narrower yet formidable difficulties stemming from incomparabilities in currently collected data. Some illustrations of the wide-spread recognition of need for an improved library statistical system are these selected ideas expressed at a national conference on library statistics held in 1966:[2a]

1. There are inadequate statistics for the proper administration of present library legislative programs and for continued financial support under existing governmental legislation.

2. There are inadequate data for the enactment and administration of necessary new library legislation.

3. There is a need for more meaningful measurement of the use of all types of libraries.

4. There is a need for better statistics on manpower utilization in the library.

5. There is a need for quantitative data which measure the performance of libraries and permit meaningful judgments regarding the adequacy of this performance.

6. There is a need for a more rational allocation of responsibilities among the variety of data collection agencies.

The preceding list presents only a small fraction of the points made at the aforementioned conference concerning inadequacies of current statistical programs and avenues for improvement. The number of recommendations for studies and courses of remedial action stemming from this one conference alone would require many large scale research efforts and massive coordinative efforts among governmental agencies, library professional organizations, library systems and individual libraries.

The picture which has emerged from our own preliminary investigation is one of an overall inadequacy of current library statistical programs for the measurement of past trends, administration, control, and evaluation of current library programs, and development of future plans. Obviously, the problem is so vast that no single research effort can meaningfully address the entirety of the tremendous multiplicity of existing problems. The research group at the Wharton School of the University of Pennsylvania, which is carrying out the study herein reported upon, decided that it could best make a contribution by concentrating on the development of a management information system which would provide the required statistical information for effective management of libraries. The problem was further delimited by confining its initial effort to the development of a national model for this management information system for large public libraries and university libraries. Subsequently, the model would be extended to systems, networks, and other cooperative arrangements among libraries. The management information system will be designed to support decision-making and planning in a planning-programming-budgeting context and will have as its general purpose the support of librarians, board members, and library and governmental administrators in planning and decision-making processes.

As indicated in the Summary, this project has been designed to be carried out in two stages: (1) The Preliminary Study and (2) The Research Investigation. The Preliminary Study was carried out over an 11-month period ending May, 1969. Since the basic objective of that study was to design the Research Investigation in the most efficient and meaningful way, this Final Report presents the proposal for the Research Investigation. Because of the special nature of this report, the arrangement of contents to fit the established rubric of Final Reports of research for the U. S. Office of Education has been difficult. Under the section headed Results, we have furnished a summary of a background study by Jerome Ackerman supported under this project entitled Statistical Measures Required for Library Managerial Decision Making Under a Planning-Programming-Budgeting System (PPBS). The complete study was accepted as an advanced study project (thesis) by the faculty of the Graduate Division of the Wharton School, University of Pennsylvania in partial fulfillment of the requirements for the degree of Master of Business Administration. Under the section headed Conclusions, we have included the text of the proposal for The Research Investigation.

METHODS

Methods

The methods used in The Preliminary Study included the conducting of interviews with governmental personnel, library directors and librarians at various managerial levels, officials of library organizations, research investigators and others and an intensive review of research studies, reports, monographs and statistical releases. A selected bibliography appears in Appendix B of this report. (This is the bibliography referred to in the proposal for The Research Investigation.)

The methodological approach to be used in The Research Investigation is that of systems analysis. Although this framework of analysis is discussed in the Conclusions section, it will be outlined here as well. This type of approach views a problem in a so-called "total-systems" context. This approach, which has been so successful in a variety of other fields, would begin in the present context with an investigation of the objectives of the library statistical system with emphasis on the uses that are and that should be made of it. The method includes a specification of the major operational functions of a system, and an identification and description of the interrelationships among the various components. The basic goal is to design an optimal system in order to maximize some measure of benefits in relation to the costs associated with different possible systems. In terms of the present problem, two levels of model construction appear to be required. The basic purpose of a management information system is to convey relevant information to decision makers. Therefore, the first level of model construction is the design of a model of the library management planning and decision-making process. The second level of model construction is the design and development of the information system required to optimize the performance of this management planning and decision-making process. As noted in somewhat greater detail in the Conclusions section, it is useful in the early stages of this type of investigation to attempt first of all to conceptualize an idealized system rather than to concentrate solely on the deficiencies and problems of an existing system. In this connection, a preliminary Library Benefit-Cost Management Model is depicted in graphic form and explained in Appendix C. This model is meant to serve as an example of the conceptual framework of an idealized library statistical data, information, and management system. The theoretical structures provided by models of this sort are extremely helpful in providing integrated and comprehensive approaches to problems of the type we are considering.

RESULTS

STATISTICAL MEASURES REQUIRED FOR LIBRARY MANAGERIAL DECISION MAKING UNDER A PLANNING-PROGRAMMING-BUDGETING SYSTEM (PPBS)

Introduction:

In the pursuit of their goals, the managements of both public and private organizations are faced with the problem of allocating scarce resources to fill unlimited needs. The decision to support a given project necessarily places a restriction on the quantity of resources available for others. Therefore, an opportunity cost is associated with the projects selected. The problem, then, is to choose those ventures which, at a minimum cost, maximize the achievement of the organization's objectives, insuring its efficient economic performance, or, in the case of a private firm, its continued economic survival.

Library Management and Resource Allocation:

The library, as a public institution, is an important component of the nation's educational system. Both the advancement of education and the growth of our technologically based economy "depend importantly upon the effectiveness of library resources in making available the required information to those who do ... research."[3]

In the above capacities, the library's role has been expanded by the following factors: a body of knowledge which grows daily; an increasing desire for that knowledge on the part of the American people, and the rapid pace of technological change with the attendant increase in leisure time available to the public. Through its collection of materials, the library must be in a position to meet the country's demands.

Library management must make decisions which will result in a maximum contribution toward the accomplishment of its chief objective: providing service to its users through its collection of materials. A library has only limited available resources with which to satisfy the demands placed upon it by its users. The library decision maker must anticipate the demands of his customers and decide what would constitute a reasonable input of resources. The relationship between cost (input) and output is important. The price mechanism and the profitability concept are absent in the library situation. Output cannot be measured in terms of units of profit or avoidance of loss. Therefore, library management must select the alternatives which it perceives will maximize the satisfaction of user demands at a fixed cost level.

To fulfill its role in the educational process and to meet its responsibilities for providing user services, the library must, in the face of rising operating costs and the expansion of knowledge,

spend its resources wisely. Pressure to achieve this objective is further heightened by the prediction that the number of active library users will dramatically increase by 1985;[4] by the requirement that libraries be responsive to the needs of the disadvantaged and illiterate in a technologically oriented society characterized by the achievement of increased skills and educational qualifications for employment; and, by the sheer scope and magnitude of governmental services which taxing jurisdictions must finance. An apparent lack of application of management principles to library management and the inadequacy of statistics collected for managerial purposes,[5] have caused library management to rely on conventional wisdom, and intuitive feelings on how money should be spent. As is apparent from the scope of the library's role and the problems it faces, this method will no longer suffice.

Each library responsible for resource allocation must establish its objectives, and through the collection and evaluation of meaningful information, must decide on the best means to achieve those objectives. It is our belief that the organization of a library's decision making process in accordance with the principles of a Planning-Programming-Budgeting System (PPBS) design can aid immeasurably in solving the resource allocation problems which that institution faces.

The PPBS concept has received its major impetus from its implementation in the Federal Government. It integrates the planning, programming, and budgeting phases of the management function. Planning, in this case, means the setting of objectives in priority sequence. Programming involves specifying the range of alternative programs to achieve each of the objectives, and indicating the resource input and the expected output in terms of benefits achieved. Budgeting is the intended allocation of resources (inputs) for a given period of time.

The objective of PPBS is to improve the basis for decision making by a process which systematically considers a range of alternatives, designed to achieve specified goals, in order to clarify the choices and their implications for the decision maker. This approach permits the decision maker to see the crucial issues, choices, and implications in resource allocation problems, and, combined with the manager's experience, intuition, and judgment, provides a better basis for eaching a program policy decision.

As an illustrative example, we will apply the elements of a PPBS design to the New York State public library system structure,[6] and to the library decision making process of that state.

Planning-Programming-Budgeting System (PPBS) for New York State Public Library Structure:

Introduction:

Before discussing PPBS concepts and their application, a brief description of the public library structure and its administration in New York State is in order.

The New York State public library structure is broken down by the organization of libraries into public library systems. A library system is "an association of autonomous local libraries working together to improve library service for all residents of a specified county or multi-county area."[7] Twenty-two systems, comprising 680 of 725 chartered public libraries and serving over 98% of the State's geographical area and population, are testimony to the expansion of the system concept of library service in New York.[8] This represents a decrease in the proportion of State residents without library service from 9.8% in 1956 to .8% at the end of 1964.[9] Exhibit I presents a map depicting the location of public library systems in New York. Exhibit II provides some statistical information about public library systems, including the name of the system, number of member libraries, area and population served, and adult nonfiction holdings in the central library.

Moreover, the State itself plays an important role in library service. Its major functions are financial aid to systems, the development and initiation of legislation related to library development in the State, advisory and consultative service provided to systems and to other libraries, and performance as a resource center backstop for State government, public library systems, and other types of libraries in New York. The State Library at Albany and the Library Development Division (LDD) are the two organizations which perform the State's library functions. The former provides library services and the latter is responsible for the planning and consultative tasks mentioned above.

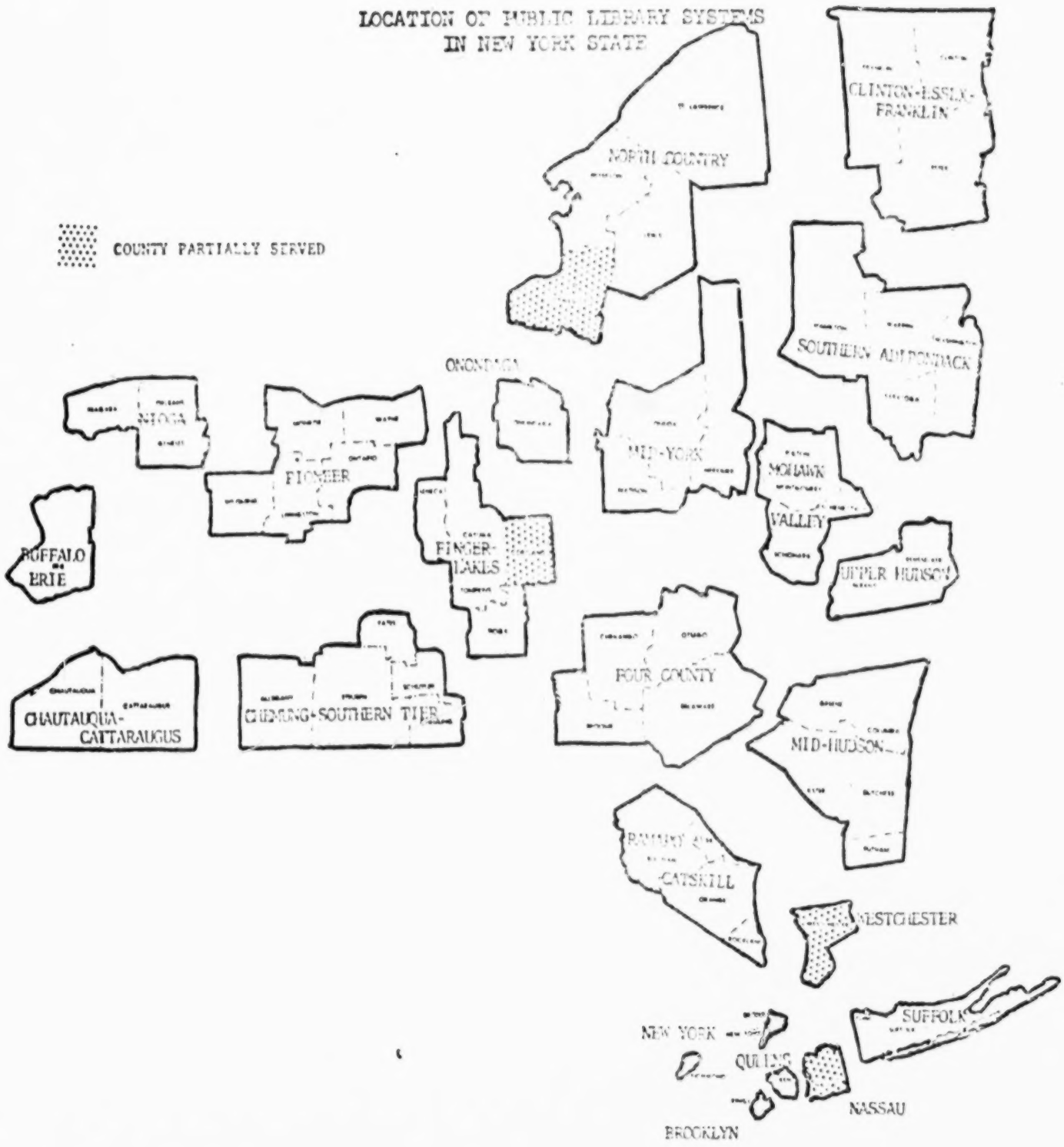
The importance of the State's role in library service is reflected in both the increase in State funds authorized for library services (from $2.5 million in 1957 - 9.7 percent of total tax support; to $10.2 million in 1965 - 16.5 percent of total tax support; then to $14,3000,000 in 1968) and in the greater access all State residents have to the State Library's services and collections, a fact made evident by the increase in interlibrary loans.[10]

Organization of the State's Library Service Functions:

State Library: The State Library is the resource backstop for the public library systems, and as such, its collections are available to all residents of the State. Its activities pertain strictly to library service operations, both for itself and - as resource backstop - for public library systems. It does not exercise any control over the public library systems.

Exhibit I

LOCATION OF PUBLIC LIBRARY SYSTEMS
IN NEW YORK STATE



Source: University of the State of New York, The State Education Department. A Primer of Public Library Systems in New York State (Revised Edition). Albany, New York: The State Education Department, 1967, page 16.

Exhibit II

LIBRARY SYSTEMS IN NEW YORK STATE

NAME OF SYSTEM	YEAR APPROVED	NUMBER OF MEMBER LIBRARIES[1]	AREA SERVED SQ. MILES[2]	POPULATION SERVED[2]	NUMBER OF CENTRAL LIBRARIES[1]	LOCATION OF BASE CENTRAL LIBRARY[1]	ADULT NONFICTION HOLDINGS IN CENTRAL LIBRARY[3]
Brooklyn	1950	1	79	2,627,319	1	Brooklyn	1,879,616
Buffalo-Erie	1950	24	1,054	1,064,688	1	Buffalo	1,309,321
Chautauqua-Cattaraugus	1960	32	2,415	226,736	2	Jamestown	86,587
Chemung-Southern Tier	1958[4]	35	3,543	278,413	2	Elmira	112,920
Clinton-Essex-Franklin	1954[5]	24	4,570	152,764	1	Plattsburgh	40,884
Finger Lakes	1958	26	2,541	235,256	1	Ithaca	62,906
Four County	1960	40	4,097	337,974	1	Binghamton	109,354
Mid-Hudson	1959	51	2,974	426,534	1	Poughkeepsie	76,130
Mid-York	1960	38	3,330	385,406	2	Utica	88,459
Mohawk Valley	1959	13	1,740	284,056	1	Schenectady	109,659
Nassau	1959	50	257	1,284,000	5	Hempstead	54,312
New York	1950	1	125	3,345,087	1	New York (Ref.)	1,528,277
Nioga	1959	19	1,430	330,422	2	Niagara Falls	94,746
North Country	1958	57	5,574	237,057	2	Watertown	39,172
Onondaga	1961	21	792	455,843	1	Syracuse	193,008
Pioneer	1952[6]	57	3,163	828,485	1	Rochester	469,011
Queens	1950	1	113	1,809,578	1	Jamaica	1,171,974
Ramapo Catskill	1959	45	2,506	458,852	1	Newburgh	68,117
Southern Adirondack	1958	25	4,281	198,090	1	Glens Falls	60,053
Suffolk	1961	42	941	908,170	2	Huntington	70,652
Upper Hudson	1960	21	1,196	434,310	1	Albany	140,861
Westchester	1958	37	422	786,297	3	Mount Vernon	165,335

1 As of July 1966
2 As of December 31, 1966
3 Figures reported by Central Libraries + CBA Books as of 12/31/66
4 Federation with Chemung 1961
5 Franklin County added in 1962
6 5-County Federation in 1960

Source: University of the State of New York, The State Education Department. A Primer of Public Library Systems in New York State (Revised Edition). Albany, New York: The State Education Department, 1967, page 16.

Library Development Division: The Library Development Division is concerned with an extensive and varied program of planning, consultation, and advisory services for libraries over the State. It administers State and federal aid, and insures that public library systems comply with their own plans and with other rules promulgated by the Board of Regents and the Commissioner of Education in order to remain eligible for State aid. LDD also administers federal funds under the LSCA. It establishes objectives for New York's library development, and in compliance with these objectives, the State Library, LDD, and the intermediaries from the systems to the local library develop their own subobjectives, along with the activities and programs designed to achieve them.

Public Library Systems and Operations:

Public Library System: A public library system is created by the vote of the boards of trustees, either of associated community libraries or of a county board of supervisors, who elect or appoint a system board of trustees. The system is chartered by the Board of Regents as an independent library agency. A system plan of service must be approved by the Commissioner of Education, and must meet minimum standards with respect to area and population, personnel, book acquisitions, and so on. Upon conformance with the above requirements, it is eligible for State aid to finance its activities. System activity is financed exclusively by State aid. However, the system is not administratively under the direction and control of the State library agency (LDD). System headquarters staff must administer and allocate these grants from the State to finance the following typical activities performed by a system:

1) the setting up of a centralized processing unit for the system
2) the provision of rotating collections and book pools
3) the reimbursement of the central library for its intrasystem interlibrary loan activities
4) the engagement in planning and coordination of functions in such matters as recommendations for new services, new library outlets, etc.
5) the providing of consultative and advisory services to members
6) the performance of public relations tasks for the system

The system's resource backstop is the central library, which is usually the branch with the largest collection. The central library receives books from the State on a matching basis of 4:1, to build its reference collection to 100,000 volumes of adult non-fiction.

A system plan for the development of central library services - a plan approved by the Commissioner of Education - provides the system with additional funds.

The system board of trustees exercises no administrative control over its local members. Its planning and coordinating activities are of an advisory nature, while all the activities it conducts must be approved by the members.

Local Library: A local library joins a public library system voluntarily through action taken by the former's board of trustees. It contracts with the system (system headquarters) to obtain various system services, some of which were indicated above, and is required to permit all system area residents to borrow from its collection. The board of trustees of the local library participates in elections of the system board of trustees. Administration, management, and control of the local library, however, are in the hands of the local board of trustees.

The local library has access to the resources of the State. Unsatisfied book and information requests are forwarded to the system's central library, and, if necessary, to system's headquarters, and eventually to the State Library for attention. The local branch also has access to the advisory and consultative services made available by system's headquarters, and by the State (LDD), if necessary. Local libraries must approve program and planning recommendations suggested by system's headquarters staff.

The local library receives its financial support from the local tax jurisdiction. It must obtain support for its fiscal requirements through the preparation and submission of a budget to the appropriating authority.

With the background of this brief description of the New York State public library structure, we can now apply the elements of a PPBS design.

Components of PPBS:

The essential elements of PPBS, as applied to the New York State library structure, are as follows:[11]

Planning-Programming: Planning is a multi-faceted process which encompasses a range of activities dealing with the determination of an organization's objectives, including review, evaluation and revision of objectives, analysis of alternative courses of action, and, finally, the selection of a course of action. The major element of the planning process, and the central core of PPBS, is the determination of the library's objectives. This involves an enumeration of the purposes for which a library is established and a statement of what it seeks to accomplish - in other words, its raison d'etre. The management of each library must develop its own set of realistic, feasible objectives, directed toward meeting the needs of the

library's users and non-users, and in accordance with the State's overall library objectives. The latter requirement results from the establishment of the aforementioned objectives in a State plan for library development, and from the increased participation of the State in planning and financing library services throughout New York.[12] As an example, the overall objectives set forth for the public libraries of New York are as follows:[13]

> Provide recreational reading for all ages;
> Serve as a reference source, making information available on any subject within the limits of its collection or trying to secure it from other agencies as the need of its clientele necessitates;
> Guide and influence the reading tastes and interests of the community into channels that will be most productive in terms of human understanding, individual economic competence, and responsible family life and citizenship.

The public libraries at each level in the hierarchical structure of a cooperative library setup, such as that of New York, are, in a sense, shareholders in a giant public library development corporation, each member acting as an independent division that is striving, in its own way, to achieve the State's overall library development objectives.

The basic unit for library development is the local library. If it is not a strong unit, and does not strive for goals which are comparable to those at the State level, the prospect of success of the State plan is indeed gloomy. Since the State finances public library system operations, provides central book aid, and affords advisory and consultative services, the range and depth of the activities of the State must bear some relationship to what the other levels are doing, and vice versa. Therefore, the activities performed at each level are interrelated and connected by a continuum of efforts directed to the accomplishment of the overall objectives. It is clear that each successively higher level builds upon what the level beneath it is attempting to do. The objectives of each level and the interrelationship of these goals constitute the pervasive thread in the fabric of the New York State library system. Thus, we may assume that the objectives of the State plan will have a direct bearing on those of local public libraries, each of whose aims will, within the natural limits of its responsibilities, harmonize with the overall objectives.

Given the public library's role as one of service to its users, and the multi-year planning horizon of PPBS, certain input forecasts must be available to plan a library's operations, and indeed, to determine feasible objectives. Data about the library's users, its potential clientele, and the collection's adequacy in fulfilling user needs, help a library to create attainable objectives.[14] In this manner, the library can determine a minimum level of service. Since PPBS is an annual process, these various data must be examined annually and objectives reviewed and revised, if necessary, in the light of what has transpired during the year by way of changes in data or socio-economic conditions.

Establishment of a Library Program Structure:

The setting of objectives is followed by the development of a library program structure. Library objectives are the focal point of the program structure, since programs are classified by objectives. A program structure is not concerned with organizational responsibility for activities. It highlights major resource allocation decisions which must be made in accordance with the library's purposes, and with the competing and complementary programs designed to carry out those purposes. In addition, it is the basis for subsequent documents generated by the PPBS design: namely, the Program Memorandum and the multi-year Program and Financial Plan.

The program structure includes all library activities in terms of what is to be accomplished, not in terms of inputs. Classification of activities in a program structure emphasizes a particular theme, under which all activities can be grouped. The first level category is usually very broad, since it is related to the library's fundamental objectives. Under each broad category are grouped the program elements, which, in combination, yield the achievement of the broad objective. Each of these program elements constitutes a total system, which contributes to the organization's objectives. Exhibit III is provided as an example of a program structure for the State Library of New York. It emphasizes the State Library's role as a resource center for State Government personnel and officials and for specialized professions, and as a resource backstop for cooperative public library systems and other libraries within the State.

Exhibit III

Example of Program Structure For State Library of New York

Overall Objective: To support, and provide for, the information needs, broadly conceived, of State government personnel and officials, specialized professions, and the State's residents in the pursuit of their various endeavors through the ready availability and accessibility of resources and data.

Resources and Services:

Objective: To provide library materials and services to users.

Definition: Included here are activities designed to provide library materials and services to meet the information needs of the aforementioned elements within the State. Whether required in conjunction with a specific profession or job, or with an educational, personal, or recreational need, the required information is considered essential to increase one's education and/or intellectual development.

State government services (executive, legislative, judicial)

Formal education services (secondary, college and university, and research)

Self-education and self-training services (blacks and whites who lack basic skills)

Specific profession services (law, medicine, education, etc.)

Job performance services (general public in performance of employment duties)

Satisfactory leisure-time opportunities, intellectual development, and personal enrichment

General Administration and Support:

Objective: To administer, through planning and executive decisions, the Resources and Services Program.

Definition: Included here are activities of a general, supporting, or administrative nature, which cannot be associated with any of the preceding categories.

Executive policy and decisions
Comprehensive planning
Facilities
Technical services
Business

Underlying the design of a program structure is a particular conception of a library's function. A possible conception is that a library is in business to satisfy the demands of its users. The users can be the general reading public or another library. In the first case, demands are generated by the public for information of many kinds which is required to satisfy a multitude of needs - recreational, educational, cultural, and so forth. In a cooperative public library structure, the supplies to meet these demands are furnished by either the community library, the system (central library or headquarters) or the State Library. Supplies can be conceived of as the output - generated by library services - which provide the document, give the answer, and so on. The same type of analogy applies when the user is another library. The demands of an individual library for information and assistance on some managerial or technical aspect of library services and operations are supplied by the system and/or the LDD. Again, the supplies are the services which the system and LDD provide, which assist the library in solving its problem and therefore increasing its effectiveness in providing library services. Ideally, we seek the equality of supply and demand, so that all user demands are met immediately. However, the ideal is not the case. Thus, the focus, at each level in the total structure, is on improving the ability of each library to meet the growing demands placed upon it.

The program structure presented earlier serves well in meeting this challenge, in that it

(1) provides a definition of a library's (or level's) fundamental objectives

(2) focuses on the functions for which each level is responsible by law

(3) recognizes the purposes for which a particular function is performed, and for whom. For example, the State Library's "Resources and Services" program recognizes its responsibility with respect to "State Government," Formal Education, and so on.

(4) lists the program elements or activities by the major program they are designed to achieve.

The costs to be shown for these activities include all those required to develop, procure, operate, and maintain a program. Therefore, the administration and operation of each of these activities would cut across all the object classifications included in a line item budget, such as personnel, equipment, and facilities.

A program structure enables one to organize his thinking with respect to allocation issues, and to lay the framework for analytical review. In conclusion, the program structure is based upon:

(1) the definition of fundamental objectives

(2) the selection of an underlying broad or major theme to designate as a program, under which activities can be listed

(3) the listing of activities under the major goal which those activities are intended to accomplish

Measures of Effectiveness:

An indicator of effectiveness is required in a PPBS design to measure the progress of a program toward the achievement of the program objective. However, the complex social impact of library programs on the public make it difficult to develop a single effectivenss indicator. Measuring the effectiveness of a library involves assessing those services or outputs it provides to its users.

The primary function of a library in serving the needs of the user is to furnish requested documents within a reasonable time.[15] Therefore, one way to measure quantitatively the effectiveness of library service (output) is to rate the library according to its speed in delivering documents to a user either from its own collection or from that of other libraries (resource backstop). Orr and his associates have developed a method to determine this relative capability.[16] The method involves the selection for a library of a representative sample of documents needed by its users, and the testing of that library to determine the length of time it would take before users could obtain these documents. Although the methodology and tests were tried on medical school libraries, the developers believe the document delivery capability measure has applicability to many types of libraries.[17]

In view of the potential of this method, it is recommended that further study be conducted to test its applicability to public libraries and public library systems.

If a public library's capability to provide documents to users is quantified, library management can set objectives by designating, on the capability index, a point which represents what they want to achieve. In turn, the future implications of the capability objective can be considered when planning future programs.

Operational Forecasts:

PPBS requires an estimate of the future year fiscal and operational implications of continuing and planned programs. Operational requirements refer to personnel, facility, equipment needs, and such. The determination of resource requirements for each alternative, in terms of dollars, provides a means of testing the feasibility of planned actions. Thus, funding requirements for each year of the activity under consideration are provided.

Cost Estimates:

Cost estimates are required in the preparation of program analyses, the multi-year Program and Financial Plan (PFP), and the budget. Forecasted costs enable the decision maker to perceive the future dollar implications of each program.

In making cost forecasts for a particular program, all relevant costs are included. Some examples of relevant costs for a specific library program might be:[18]

(1) One-time, fixed costs, such as those for the planning, testing, and evaluation of a demonstration project

(2) Investment costs, such as those for land, building and facilities, equipment and vehicles, and initial training of personnel

(3) Recurring, or operating and maintenance, costs, such as personnel salaries and wages; maintenance of equipment, vehicles, and buildings; materials and supplies; books; overhead costs, and so forth.

The importance of cost estimates cannot be overemphasized. Future year cost implications for a sufficient time period to give a reasonable idea of program impact and provide relevant information, can determine whether or not a program is feasible, and thereby affect its chances for selection.[19] The basic problems in cost forecasting are estimating costs and quantifying them over the future planning period for the alternatives under consideration. Cost estimates are difficult to make because of the uncertainties involved; for example, the lack of cost data history and the effect of quality and quantity of materials in such a program.[20]

This uncertainty factor would necessitate the availability of a specialized staff with considerable technical knowledge to estimate this data. In view of the planning and coordinating activities carried on by system headquarters and the LDD, these organizations would be the logical choices for providing this capability.

Output Estimates:

Output indicators of the gains resulting from costs incurred for library programs are also estimated for each year of the multi-year planning period, for each program.[21] Output indicators reveal the quantified accomplishments realized through expenditures on library programs. One illustration of an output indicator would be an estimate of the library's document delivery capability (capability index) over the planning horizon, and an indication of annual improvements in this measure as funds are expended on library programs. Other examples would be: the number of professional staff employed; library space per user; library staff per user ratio; number of volumes of books purchased by subject; periodicals purchased, and so on. Any of these indicators could be meaningful to the staff of a particular library.

The principal types of output measures are those which indicate the magnitude of goods and services produced, such as the number of books, periodicals, films, records, and equipment purchased. They are the measures which indicate, in a rough manner, the quality of goods and services in terms of their characteristics, duration, and content, such as hours of service provided, number of professional staff in graduate school, ratio of specialty consultants to number of users of their services, and changes in the number, types, and characteristics of those using the library.[22] Other indicators could be comparative in terms of magnitude, in relation to population, area, and the like - as, for example, books or periodicals per capita, consultant specialists per area served, and so on. Since output indicators must be denoted for each program, it is incumbent upon library management to study its programs carefully in terms of objectives, accomplishments, etc., in order to determine realistic indicators for each program. There are no pat rules. The indicators must be relevant, simple, and applicable to the program undergoing analysis.

Output indicators can be useful in other respects. They can help "set priorities and objectives for new programs, decide among proposals for new programs, and evaluate the effectiveness of past programs."[23] For example, suppose that in the "Resource and Services" program of the State Library, it was decided to strengthen the book collection in the physical sciences for use by students from the secondary level through undergraduate college education. The output indicator for year 19XX has denoted a quantity of X volumes, each to be added in the subject areas of chemistry, biology, and physics. After the program has been in operation, actual experience can be compared with estimated output. If the outcome is unsatisfactory, it may be desirable to establish the objective of accomplishing the purchase of X volumes or revising this estimate. Since the objective is essential to the continued effective functioning of the library, it can be given top priority over

other actions. In addition, the need to prescribe some new action to meet an output indicator may arise, in view of an analysis of estimates of predicted outcomes. This process can lead to changes in the levels of programs, in the related cost level, and in the effect on the output indicator (causing the output estimate to rise or fall).

Program Memoranda (PM):

A major output of the PPBS design is the multi-year PM, or plan, which defines the policy guidelines and objectives as well as the major program decisions of the library administration, and is indicative of where the library is going in the future and how it intends to get there. The PM also explains why the major program decisions were made, and describes anticipated program accomplishments. The PM is the result of systems analyses conducted during the year, taking into account "input forecasts, operational forecasts and estimates of output indicators in the future."[24]

Program and Financial Plan (PFP):

The PFP is another major document output emerging from PPBS design. It is prepared as a result of the systems analysis conducted during the planning-programming cycle, and reflects tentative program decisions, displaying the estimated cost and estimated output indicators by the activities within each program. The PFP denotes the feasibility of program decisions in terms of the revenue available to meet program expenditures and, indeed, indicates the relationship between the total program expenditures and revenue, as well as any imbalance between them. The output indicators provide a ready reference for what is being purchased by the expenditure of funds. The PFP is also indicative of the relationship between output indicators and changes in costs. Changes in output indicators in the output plan are reflected on the cost side by increased or decreased expenditures in a program, or in such input factors as user population.

Budget:

The first year of the PFP becomes the basis for the preparation of the budget, insuring a relationship and compatibility between the budget and the policy decisions, objeltives, and programs of the PM and PFP. The budget approved by the library's taxing jurisdiction becomes the authorized plan of action for the library's activities during the ensuing year. The PFP, which provides only guidelines to action, is revised to reflect these decisions, thereby serving as both a summary of program decisions and a starting point for the next annual PPB cycle.

Statistical Requirements of PPBS Design For Cooperative Public Library Systems

Data must be "recorded and revised to support management decisions for planning, operating, and controlling." [25] These data must then be made available to managers at all levels with a recognized need to know, thereby providing them with useful information.[26] These axioms apply to information required for a PPBS design. Before we indicate specific PPBS information requirements, however, the statement of a few assumptions is in order. First, what follows is a description of the general categories of data required. More explicit data requirements can best be determined at the planning level in each library or public library system. Secondly, this is not an attempt to denote the availability, collectability, or sources of this data. And finally, the categories which follow attempt to identify broad divisions applicable to a PPBS design. Therefore, no discussion or comment is offered on the relationship between these data and those currently collected by the library profession in accordance with the recommendations of professional organizations, or as required by State, local, and Federal laws.

The major categories of information required for a PPBS design are:

(1) Demographic information, such as population data (age, sex, etc.) Population is a key to forecasting levels and costs of programs. The presence of a large group of disadvantaged in a community can result in certain types of program decisions and levels of expenditure.

(2) Economic and social data, to determine the economic future of the community, its potential for growth, and the educational level of the community and its relationship to the use of libraries. Employment figures are important, since people are likely to move to areas with a high level of employment opportunity. Income levels provide some insight into the tax sources of the jurisdiction, and possibly an indication of revenues available to the library.

(3) Financial data, to determine program costs and to direct planning. Wage and price data are important because they are the chief determinants of costs to the library. Obviously, much cost data will be required on all aspects of library operations. This means that data will be required on all costs pertaining to a particular program - such items as wages and salaries, costs of operating and maintaining the facility, costs associated with technical services, etc. Cost data must be allocated among the various programs. It is therefore recommended that a possible research topic is an analysis of library operations for purposes of delineating the various costs associated with those operations, indicating those cost data which are readily available, and commenting on the feasibility of collecting other required data which are not currently available.

(4) Output indicators, to estimate the output or results of library expenditures by program. Traditionally, library budgets have been classified by objectives of expenditures, such as construction, facilities, personnel, and so on, without regard to the results of these expenditures. An analysis of library operations is needed for purposes of specifying library outputs and the feasibility and degree of difficulty of collection of data.

(5) Measures of effectiveness. We have previously recommended that the applicability of the capability index to public libraries be studied as one way to measure the library's major service - its capability in providing documents. Measures of effectiveness are lacking in other areas of library service, as well as in the quality of library services and their impact on the user. Additional study is required in these areas. A thorough study of output indicators may provide another means of evaluating library service. Such indicators can be potentially meaningful to a professional librarian for action needed in the future.

(6) Collection characteristics. In devising the program structure in terms of purpose and target group, it is necessary to know the magnitude of current holdings geared to the various target groups. Changes in the magnitude of holdings by type, category, subject matter, and so on, will be required for comparison with output estimates. The quality of any collection is important. Increased demand, the knowledge explosion, higher material costs, and the expectation that the local library will provide the most frequently used materials, indicate that great care is needed in the selection of library materials. These factors further necessitate the collection of data about the quality of the library's holdings.

(7) System activities. Since public library systems are based on the principle of sharing resources and avoiding their duplication, each member of the system should be provided with data concerning the collection and programs of the central library and the system headquarters, since the latter are the principal resource backstops of the system. These data can then be used in the PPBS cycle for determining what programs the local library wants to undertake. In the system context, neither the collections of an individual library nor its expenditures reveal the extent or true range of library services available to the public.[27] Rather, these factors are disclosed by the sum total of services for all libraries in the system. The size of the book collection of a system does not represent the same

strength as a similar number of books held by one library because of the duplication of titles held by the system.[28] Data pertaining to system activities and the activities of the member libraries are needed by each of these organizations in planning its programs effectively. Thus, statistics on the character of the collections of members and system headquarters, similar to those recommended under "Characteristics of the Collection" should be made available for planning purposes.

The statistical categories presented above are indicative of the general nature of the data required for the establishment of a PPBS design. When a PPB system is established and set into operation, more explicit statistical measures will be determined. These measures will be the natural result of a detailed analysis of library operations, and the formulation of objectives, program structure, measures of effectiveness, and indicators. As the level of the analysis intensifies, explicit statistical data become known.

PPBS is a management construct designed to improve the basis for public decision making. The specific tasks that a library or any agency is required to perform in a PPBS context constitute, in themselves, a beneficial exercise. The requirements of a PPBS design - definition of objectives, development of an objective-oriented program structure, consideration of future implications of decisions, and the inclusion of all pertinent costs over a multi-year planning horizon - are essential to any reasonably functioning decision making process, although it is our belief that they are never truly fulfilled. The establishment and operation of a PPBS leaves none of these requirements to chance, as the system design demands that they be carried out.

PPBS can be of great importance to those organizations, libraries included, which choose to attempt such a system. It encourages the use of planning as the best device for assessing the future, and the making of better decisions in terms of "ends and means, goals and resources, outputs and inputs.[29]

The contribution of PPBS to planning consists of the encouragement of systems analysis of program alternatives, the aggregation of programs by objectives, and the multi-year projection of costs. The planning function is important also because it features evaluation and revisions of ongoing programs in the light of experience, and changing expectations and conditions, as manifested in input and output indicators and measures of effectiveness. It can be said that, as a result of the planning function, PPBS provides the library and other organizations using this design with:

(1) the ability to see their objectives comprehensively

(2) an awareness to seek out alternatives for achieving objectives

(3) an ability to determine program priorities and more explicitly express program objectives[30]

Programs are evaluated on the basis of measures of effectiveness, which indicate progress toward objectives. The concepts of input and output indicators set the level and type of program and clarify the decision maker's idea of what is purchased through the expenditure of funds. These concepts are radically different from those under which libraries have traditionally operated. Here again, library management is given an indication of how effective it has been in the expenditure of funds.

PPBS is not without its difficulties. Conceptually, it is quite logical and reasonable, but operationally, it may present many problems. It is easily perceived that the first element in a PPBS design is the identification of fundamental objectives, but it is not so easy for an organization to develop them in writing. The latter task involves nothing less than a study of the organization's operations and its decision making apparatus. But this issue, like all others in the establishment of a PPBS design, must be faced.

In addition to the task of identifying objectives, other conceptual problems include the development of a program structure and the grouping of programs and activities by objectives. Illustrations of one type of program structure have been presented. This sample represents an initial attempt to devise a library program structure. We do not imply, however, that other program structures, with different orientations, would not be useful. Furthermore, as wider experience and knowledge are gained in such areas as measures of effectiveness, social indicators, and so on, we would expect the nature of the program structure to change.

Practical problems also exist in the implementation of a PPBS design. It is questionable whether libraries with only small expenditures, would benefit from such a stystem. Further, the availability of qualified personnel to carry on the PPBS effort would be seriously lacking at the local level. Estimates of multi-year cost prejections and of the costs to be included present additional problems when an analytical staff is lacking. The need to develop both staff capability and experience in cost analysis is imperative, since program decisions are based upon a comparison of benefits to costs. Time, experience, and research will have to provide answers to these issues. The feasibility of PPBS for libraries of different sizes and types, and the policy implications of coordination of planning effort within and among levels, are issues worthy of additional study.

C O N C L U S I O N S

A SYSTEMS ANALYSIS OF THE LIBRARY AND INFORMATION SCIENCE STATISTICAL DATA SYSTEM: THE RESEARCH INVESTIGATION

A. Problems and Objectives:

This study is a continuation of an investigation whose long run goal is the design and establishment of a national model for a system of library statistical data. The research carried out thus far indicates there is a serious need for an improved system of library and information science statistical data. This confirms the widespread recognition throughout the library profession that this need exists and that it should be met. Indeed, as an example, commenting on the questions of how funds available for the construction and support of libraries and library services can be more effectively and efficiently utilized to yield the most benefit for the taxpayer's dollar, the Report of the National Advisory Commission on Libraries, October 1968, states, "The pitiful incompleteness and tardiness of library statistics, and their lack of comparability, makes it impossible to give specific quantitative responses to this series of questions. No one knows precisely, or even with close approximation, what the total present library expenditures of the nation are, or even what the federal contributions to these expenditures are - nor can even approximately reliable specific estimates be made of the costs of remedying the serious deficiencies in library service that we all know exist." Analogous deficiencies can be cited in every other major category of library statistics.

The basic objectives of this research investigation remain as stated in our earlier proposal:

(1) to analyze the multiplicity of requirements for library and information science statistical data. Particular emphasis will be placed upon informational needs for management decision-making to include data requirements for planning, programming, budgeting, operational decision-making, policy formation and evaluation.

(2) to study the nature of the data that are available under the present statistical system and activities, and other pertinent data sources outside the library field.

(3) to compare (1) with (2) so as to accomplish an evaluation of data requirements versus availability.

(4) to specify the nature of a comprehensive library and information science statistical data system which results from the analysis conducted in steps (1) through (3). Since any system will be less than perfect, adaptive controls should be included for detecting and correcting deficiencies in the system as they develop.

(5) to provide a set of recommendations classified by priority level upon which to base a "national model" for library statistics.

In studying the problem of a system of library statistics and using the guidance of experts in the library field, we have decided that this project should concentrate on the development of a management information system which would provide the required statistical information for effective management of (1) large city public libraries and (2) large university libraries. The management information system will be designed to support decision-making and planning in a planning-programming-budgeting context. The general purpose of the system will be to aid librarians, administrators and board members in the planning and decision-making process so that the library may operate at maximum effectiveness to yield maximum benefits. We will be concerned both with the statistical information required for the library's administrative and managerial purposes, and with the information required at other levels, such as by library associations, legislators, government administrators and funding officers. It is in this sense that the term "management information system" is used throughout this proposal. The long run challenge is the design, development, and implementation of a management information system that can deal effectively with current and emerging problems of an increasingly complex library environment.

Since the beginning of this project, an intensive review of relevant research studies, reports, monographs, and statistical releases has been and continues to be carried out. A selected bibliography is attached (Exhibit 1). Although a number of these studies have been helpful in terms of suggesting possible lines of investigation for this study, it appears that to this date no research investigation of the type herein proposed has been conducted in the library field.

B. Description of Activities (Procedures):

This research investigation is designed to be carried out in two phases. The present proposal is for funding of Phase 1, which is scheduled to be completed in one year. It is anticipated that Phase 2 will require an additional one year period. Funds will be requested for Phase 2 at the appropriate time.

The research investigation is partitioned as follows:

Phase 1

Design and development of a management information system for large city public libraries and large university libraries.

Phase 2

(a) Tests of the feasibility, stability, effectiveness and costs of the management information system developed in Phase 1.

(b) Extension of the management information system to systems, networks, and other cooperative arrangements among libraries.

The development work described under Phase 1 is to be carried out through an intensive study using a large city public library and a large university library as the bases for the construction of pilot model management information systems for these two different types of libraries. Although two particular libraries will be utilized in this phase of the study, the statistical data systems would be general ones designed to be applicable to all libraries of the given type. The specific libraries to be used in Phase 1 have not as yet been selected. It appears desirable to use the guidance of advisory committees in this selection process. At this time, no prejudgment has been made concerning the formation of an advisory committee(s) for this project. Possibilities include a single advisory committee for the study or separate advisory committees for the public library and university library areas. Both possible arrangements possess advantages and disadvantages, and although no definite decision between the two seems necessary at present, the advice and review contributions of knowledgeable professionals in the library field and other relevant persons provided through the aegis of an advisory committee(s) have obvious potential value.

The methodological approach to be used in Phase 1 is that of systems analysis. This type of approach in general views a problem in a so-called "total-systems" context. Regardless of the nature of the system investigated, this method involves a specification of the major operational functions of a system and an identification and description of the interrelationships among the various components. The basic goal is to design an optimal system in order to maximize some measure of benefits in relation to the costs associated with different possible systems. Translated in terms of the present problem, two levels of model construction appear to be required. It seems axiomatic that the basic purpose of a management information system is to carry relevant information to decision-makers. Hence, the first level of model construction is the design of a model of the library management planning and decision-making process. The second level of model construction is the design and development of the information system required to optimize the performance of this management planning and decision-making process. It is important to note that we have chosen not to take an alternative approach of merely attempting to improve the existing information system provided by library statistical data. Such an approach would involve a considerable risk of excessive concentration on observed problems. Systems analysis and operations research in other fields strongly suggest that especially in the early stages of an investigation of a system, it is useful to disregard what appear to be feasibility constraints and to attempt first of all to conceptualize what might constitute an ideal system. Practicality and feasibility considerations are then more rationally introduced at later stages.

In work carried out thus far, we have concluded that a model of the library management process must include (a) a formulation of library missions, objectives and priorities, (b) a determination of the present and anticipated demands for library services, (c) a determination of the resources available to meet these demands, (d) the construction of measures of the relationships between

the demand and supply factors in (b) and (c) in order that strategies and programs may be developed to yield maximum benefits in relation to costs. An information system for such a model involves data requirements in categories such as (a) potential clientele, (b) user clientele, (c) collections, (d) service, (e) awareness, (f) personnel, (g) sources and uses of funds, (h) physical facilities, and (i) equipment.

Clearly, the development and implementation of a detailed national model for a management information system involving the specification and means of provision of detailed information in all of the above-mentioned categories for large public libraries and large universities constitutes a long range research and implementation effort. The effort outlined for Phase 1 could potentially make a useful contribution in the following ways:

(1) the development of a management model to assist librarians or administrators in the decision making and planning process for effective management of large city public libraries and university libraries.

(2) the specification of the basic information required for effective library management.

(3) the classification of potentially useful statistical data according to (a) availability under present statistical system, (b) availability from sources outside the library system, (c) potential availability.

(4) specification of the nature of a management information system for a city public library and a university library.

The investigative effort involved in accomplishing Phase 1 of this proposal would involve intensive work in the selected large city public library and large university library by our research team. These research activities would include interviewing and working with various levels of library managerial personnel, studies of library planning, decision-making, and operational processes, and to the extent deemed necessary, the carrying out of surveys and observational studies relevant to the construction of the library management information system. In order to carry out this investigation successfully, it is considered essential that a professional librarian at each of the two specified libraries would devote about one-half time to this project. Appropriate budgetary allowance has been made for this requirement.

As indicated, Phase 1 will concentrate on the design and development of a management information system for large public libraries and large university libraries. The testing of this model would be carried out during Phase 2. Although libraries of a given type such as large university libraries have many common characteristics and similar basic information requirements, there are substantial differences in objectives, organizational structure, collections, and so forth among these libraries. Therefore, the management information system designed in Phase 1 should be tested for stability by studying other libraries of the same types. Since the management information system

developed in Phase 1 is meant to be a national model and hence to have applicability beyond the particular setting in which the research is conducted, a less intensive study of other libraries of the same type will permit a determination of the extent to which the findings of Phase 1 should be adjusted or modified to account for inter-library differences. Also some basic tests of the feasibility, effectiveness, and costs of the proposed management information system would be carried out in this second phase of the study. Finally, considering the trend toward the formation of library systems, networks and other cooperative arrangements of autonomous individual libraries to improve the general level of library service, the management information system developed in Phase 1 will be extended and modified to accommodate these library interrelationships in Phase 2.

The following is a tentative time schedule for completion of Phase 1:

1. May 29, 1969 - September 15, 1969

   Development of the management model for the decision-making and planning process in large city public libraries and university libraries.

2. September 15, 1969 - January 15, 1970

   Development of basic information requirements for effective management of large city public libraries and university libraries.

3. January 15, 1970 - May 29, 1970

   Development of management information system for large city public libraries and university libraries.

C. The Use to be Made of Findings:

Publication of the major findings of this study will be attempted in the professional library journals and in professional journals in the fields of management science and statistics. Management Science and The Journal of the American Statistical Association are examples of the latter types of publications.

Furthermore, under guidance from the advisory committee(s) and the Office of Education, the study would attempt to develop the best method of publication of its findings, perhaps in monograph or book form. This may be an independent publication effort or perhaps some type of joint effort with an appropriate professional organization(s).

Personnel and Facilities:

Staff Summary

Name	Function	Percent of Time
1. Dr. Morris Hamburg	Principal Investigator	57
2. Dr. Richard C. Clelland	Research Investigator	22
3. Mr. Michael R. W. Bommer	Research Associate	100
4. Mr. Leonard E. Ramist	Research Associate	100

1. Professor of Statistics and Operations Research Advisor in Statistics, Graduate Group in Business and Applied Economics, Wharton School, University of Pennsylvania.

2. Chairman and Professor, Statistics and Operations Research Department, Wharton School, University of Pennsylvania.

3. Ph.D. candidate in Statistics, Graduate Group in Business and Applied Economics, University of Pennsylvania.

4. Ph.D. candidate, Graduate Group in Operations Research, University of Pennsylvania.

APPENDIXES

Appendix A

References

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   James Krikelas, "Library Statistics and the Measurement of Library Services," ALA Bulletin, May, 1966, pp. 494-499.

   Mathematica, On Library Statistics, Princeton, N. J., 1967.

6. The New York State public library structure is used to denote the various levels of public library services in the state. There are those provided at the State level by the State Library and Library Development Division (LDD), at the public library system level by the system headquarters and central library, and at the local level by the community library as a member of a public library system. The words system, or public library system are used to denote the public library system level and its associated members, and should not be construed to mean the formal three-level hierarchical structure of library services in New York State.

7. University of the State of New York, The State Education Department, A Primer of Public Library Systems in New York State (Revised Edition), Albany, The State Education Department, 1967, p. 1.

8. Division of Evaluation, Emerging Library Systems, p. 5.

9. Ibid., p. 5.

10. Ibid., p. 193-194.

11. The PPBS model which is discussed has applicability to cooperative library systems as they now exist in New York. These include fifteen of the twenty-two systems. The cooperative system is established by the direct action of the trustees of those local libraries which will constitute the system. The trustees of the local member libraries elect a system board of trustees to manage system activities. Through its trustees, each member library is responsible for obtaining financial support for its operations from the local supporting jurisdiction. Two other systems are in operation in New York as follows:

    (a) The consolidated system as exemplified by the three New York City systems wherein there is a single board of trustees which manages and is responsible for the entire library services program. It is recognized by a central city library and its branch libraries.

    (b) The federated system is created by the vote of the county board of supervisors, who also appoint a system board of trustees to direct and control system activities. The boards of trustees of the various local libraries decide whether or not to join the federation, which encompasses a county-wide area. Federation members contract annually with the system trustees for system services. Members are responsible for local management, administration, and, generally, the obtaining of necessary fiscal support from their supporting jurisdictions through their boards of trustees.

12. Some of the factors which brought about the need for increased State participation in providing library services are enumerated in the book, Emerging Library Systems: The 1963-66 Evaluation of the New York State Public Library Systems, p. 193-194, as follows:

    (a) increased mobility of people, resulting in constant crossing of the boundaries of minor civil divisions for shopping and other services;

    (b) more sophisticated educational needs, requiring more frequent use and a higher degree of coordination of specialized resources;

    (c) greater emphasis on equal educational opportunity for all citizens of the State;

    (d) growing recognition of wide differences in the ability of localities to support quality educational services;

    (e) increasing dependence on expensive equipment and a steady widening awareness of the importance of research and innovation; and

    (f) statewide leadership in order to keep pace with the educational needs of a society characterized by rapid change.

13. Division of Evaluation, Emerging Library Systems, p. 233.

14. A highly educated, literate clientele places one type of pressure on libraries. Flowing from the technological orientation of society are the increased skill and educational qualifications required for economic survival, and the steady decline in the number of unskilled jobs. Thus, if the library is to serve to bring the unskilled, disadvantaged, and illiterate into the mainstream stream of society, it must know these traditional non-users (non-readers) of library services.

15. Richard H. Orr, et al, "Development of Methodological Tools for Planning and Managing Library Services: Measuring a Library's Capability for Providing Documents," Bulletin of the Medical Library Association, No. 3, Vol. 56, July, 1968, p. 241.

16. Ibid., p. 241.

17. Ibid., p. 266.

18. State and Local Finances Project, The George Washington University, Planning-Programming-Budgeting for City, State, County: PPB Notes 1-8, Washington, D. C., George Washington University, 1968, Note 6, p. 7.

19. Ibid., p. 8.

20. Ibid., p. 11.

21. Ibid., Note 7, p. 2.

22. Ibid., p. 9-14.

23. Government Studies Center, Fels Institute of Local and State Government, University of Pennsylvania, General Design for an Education Planning-Programming-Budgeting System, Philadelphia, Government Studies Center, 1968, p. 107.

24. Ibid., p. 17.

25. Adrian M. McDonough and Leonard J. Garrett, Management Systems: Working Concepts and Practices, Homewood, Illinois, Richard D. Irwin, Inc., p.4.

26. Ibid., p. 97.

27. Joel Williams (Director), Library Statistics: A Handbook of Concepts, Definitions, and Terminology, Chicago, American Library Association, 1966, p. 32-33.

28. Ibid., p. 33.

29. David Novick (ed.), Program Budgeting: Program Analysis and the Federal Budget, Cambridge, Massachusetts, Harvard University Press, 1965, p.353.

30. Report of the Subcommittee on Economy in Government of the Joint Economic Committee, The Planning-Programming-Budgeting System: Progress and Potentials, Washington, U. S. Government Printing Office, 1967, p. 3.

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Appendix C

Library Benefit-Cost Management Model

Introduction

The accompanying diagram depicts functions, functional relationships,and statistical data and information flows for the management of an idealized library in a benefit-cost context. This diagram is not intended to prescribe an organizational structure for library management, but rather to serve as a graphic aid in describing the conceptual framework of an idealized library statistical data, information and management system which will be developed and synthesized in the forthcoming year. This framework, as presented, is not restricted to a particular type of library but is intended to be sufficiently broad to apply to virtually any type of library.

Society

Most library financial support originates from governmental grants, a parent organization and private contributions. These funds are utilized to influence user-library interaction, in which individuals in the population to be served are brought into contact with documents of recorded human experience. This contact has the potentiality of educating, informing, motivating, and developing self-reliance with respect to all areas of individual endeavor; vocation, recreation, citizenship or public affairs, aesthetics, health, child care, consumer decision-making, etc. Collectively, the library acts as an accelerator to further societal goals in the area of education, science, health, social welfare, etc.

Data regarding current and future financial support are an important factor in the library management process. Other relevant data and information collected from the general realm of society to be utilized in the library management process originate from such sources as book publishers, equipment manufacturers, other libraries, etc.

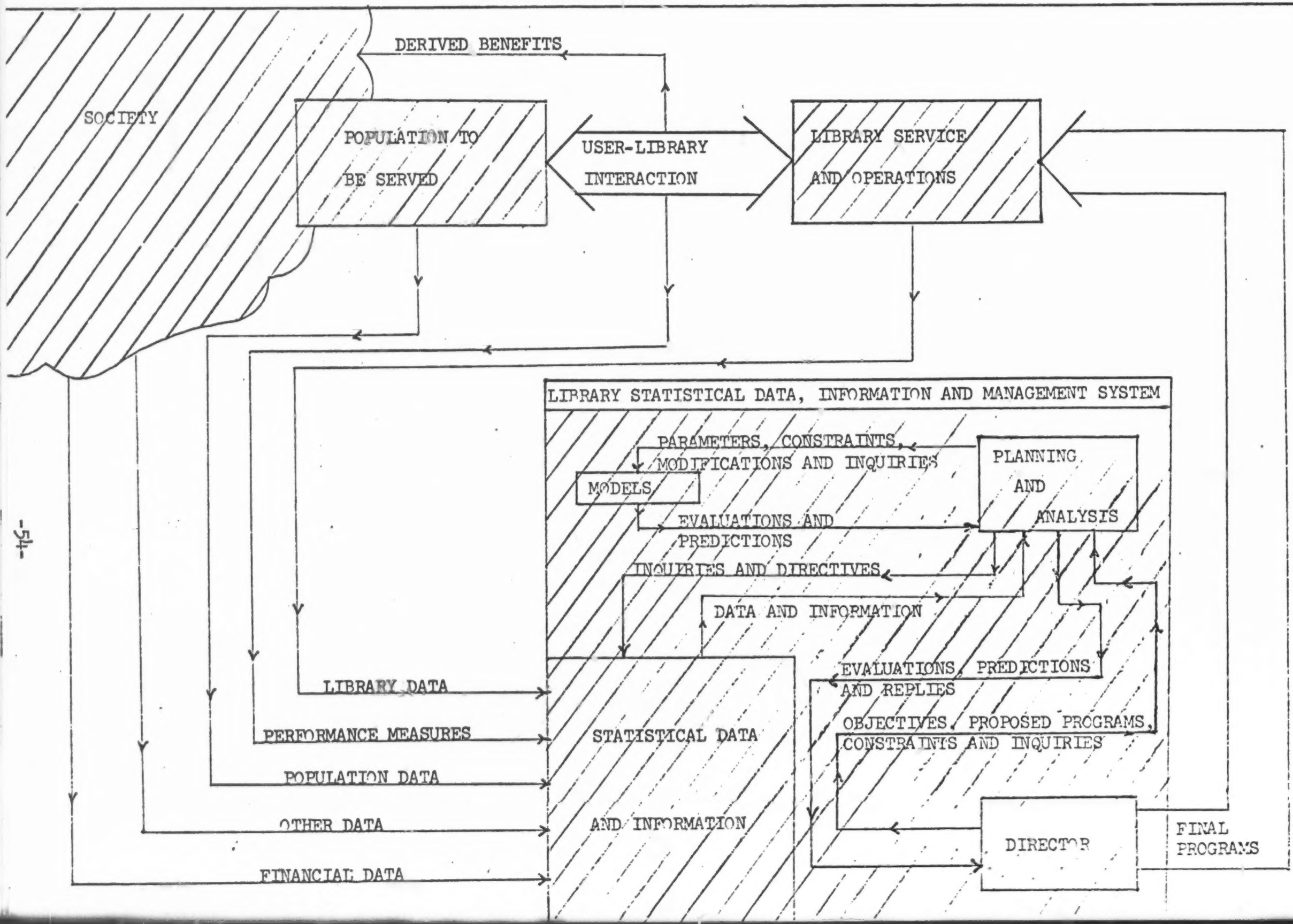
Population to be Served

The population to be served is a subset of society and may be defined in terms of residence, affiliation, occupation, demographic and other characteristics. Information concerning this population is obtained in order to predict demand and needs of the users.

Library Service and Operations

Library programs are implemented and incorporated into the library service and operations function to carry out library goals and objectives. Library programs are concerned with such activities as acquisition, cataloguing, reference, stack maintenance, inter-library loan, circulation, etc. Information regarding input to programs measured in terms of funding and output measured in terms of services offered are required for future planning.

LIBRARY BENEFIT-COST MANAGEMENT MODEL



User-Library Interaction

The population to be served and the library services offered interact. The utilization of library services yields societal benefits discussed previously. Although these benefits are not easily measurable, information obtained from such sources as circulation records and in-library use surveys can be utilized to construct performance measures which are indicative of the derived benefits. These performance measures can then be utilized in the management process.

Statistical Data and Information

The statistical data and information collected to be utilized in the management process include population data, financial data, library service and operations data, performance measures, and other data. These data may be summarized and synthesized prior to use.

Models

Library models describe functional relationships between library decision variables and constraints in relationship to the goals and objectives of the library. Models may be used to make forecasts, to aid in the evaluation of programs and to assist in the determination of optimal decisions.

Planning and Analysis

This function of the library management process involves the development and modification of models, the development of proposed plans and programs in coordination with the director and other key staff officials, evaluating the effectiveness of proposed programs from a benefit-cost viewpoint utilizing the models and statistical data and information collected, and performing other services in this area as required.

Director

In the final analysis the director of the library is responsible for the planning and decision making involved in the management of a library. The collection of statistical data and information, the development of models and the utilization of each of these in the planning and analysis function represent a framework for a management process. It is believed that directors can be aided considerably by this form of a rational approach to management processes of planning and decision making.